

What is claimed is:

1. A method of manufacturing a semiconductor device comprising the steps of:

forming a semiconductor film on a substrate and then growing spherical or hemispherical grains on the surface of the semiconductor film;

diffusing an impurity to the grains grown on the surface of the semiconductor film; and

removing the impurity product, which is generated in the step of diffusing the impurity, from the surface of the semiconductor film using hot water.

2. A semiconductor device as claimed in claim 1, wherein the semiconductor film is formed of a silicon material and phosphorus or arsenic is used as the impurity.

3. A method of manufacturing a semiconductor device as claimed in claim 1, wherein deionized water is used for the hot water.

4. A method of manufacturing a semiconductor device as claimed in claim 1, wherein the temperature of the hot water lies within the range of 30°C to 80°C.

5. A method of manufacturing a semiconductor device as claimed in

claim 1, wherein the semiconductor film which contains the impurity and the grains are formed thereon is used as one of electrodes of a capacitor.

6. A method of manufacturing a semiconductor device as claimed in claim 1, wherein the semiconductor film which contains the impurity and the grains are formed thereon is used as a floating-gate electrode of a nonvolatile memory.

7. A method of manufacturing a semiconductor device as claimed in claim 1 further comprising a step of removing native oxide on the semiconductor film after the step of removing the impurity product.

8. A method of manufacturing a semiconductor device as claimed in claim 7, wherein the native oxide is removed using a mixed solution of hydrofluoric acid and deionized water.

9. A method of manufacturing a semiconductor device comprising the steps of:

forming a semiconductor film on a substrate and then growing spherical or hemispherical grains on the surface of the semiconductor film;

diffusing an impurity to the grains grown on the surface of the semiconductor film; and

removing the impurity product, which is generated in the step of diffusing the impurity, from the surface of the semiconductor film using

either a mixed solution of hydrochloric acid and hydrogen peroxide or a mixed solution of sulfuric acid and hydrogen peroxide.